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10/759,115	01/20/2004	Takashi Imamura	Q79433	6670

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EXAMINER	
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ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/759,115	IMAMURA ET AL.	
	Examiner	Art Unit	
	Tsung-Yin Tsai	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *6/14/2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/20/2004 and 4/27/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAIL ACTION

Applicant's amendments are received on 6/14/2007; noted and made of recorded.

Acknowledge of amendments to specification.

Acknowledge of amendments to claims 1 and 2.

Acknowledge of addition of claims 21-26.

Response to Argument

Applicant's argument – Amendment of specification as requested by examiner.

Examiner's response – examiner withdraw objections to specification.

Applicant's argument – Amendment of claims as requested by examiner.

Examiner's response – examiner withdraw objection of claims.

Applicant's argument – Claim 1 recites, "a threshold value control means which stepwise sets a plurality of threshold values for binary-coding radiation image data of an object." The Examiner alleges that Matsubara teaches or suggests all of the elements of claim 1. Applicants respectfully disagree.

Examiner's response – Applicant argues Matsubara teaches only composition of one single image only; which examiner disagrees. Matsubara teaches in page 4 lines 5-17 that a constructing algorithm, which is the controlling means, for detect in mass shadows using threshold values, where the images are classified into **three** categories

comprising of fat, mass shadow and false-positives candidates detected by using threshold values. Page 6 lines 10-15 further disclose that these three categories are base on different specific pixel values, which can seen as different threshold values require for creation of different images. Matsubara also teaches the issue of stepwise, which is claimed, on page 6 lines 10-25. Page 6 lines 10-25 disclose three threshold values for the three different categories of images created; low pixel value, maximum value of average and high pixel value, which in that order is interpreter as the step threshold values.

Applicant's argument – Further, claim 1 recites, in part, "a primary-label region extracting means which attaches a primary label to an isolated region in each of the binary images and extracts the isolated regions attached with the primary label as primary-label regions". The Examiner cites to page 5, paragraph "1) Classification of Images" to page 6-7 for support. Applicants respectfully disagree.

Examiner's response – Matsubara teaches in page 4 lines 5-17 that a constructing algorithm, which is the controlling means, for detect in mass shadows using threshold values, where the images are classified into three categories comprising of fat, mass shadow and false-positives candidates detected by using threshold values. Page 6 lines 10-15 further disclose that these three categories are base on different specific pixel values, which can seen as different threshold values require for creation of different images. With the given threshold values images are created base on segregation of values that are above or below the threshold values; thus, this is seen as the three

different binary of the images created base on the low, maximum average and high threshold values. Further segregation for primary label region is carry out on page 5 lines 3-15. Page 5 lines 3-15 extract the primary region base on the boundaries, which is dependent on the density distribution in the images for each line for the region of interest. Thus, Matsubara teaches primary region extraction on binary images.

Claim Rejections – 35 USC 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-20 and 23-26 are rejected under 35 U.S.C. 102(b) as being unpatentable over Tomoko Matsubara (Development of high-speed processing algorithm for mass detection based on thresholding technique in mammograms. Medical Imaging Technology Volz 15 No. I January 1997 Research Paper , pages 1-13. IDS.)

Tomoko Matsubara disclose the following method:

(1) Regarding claim 1:

a binary image generating means which carries out binary-coding processing on the radiation image data by the use of each of the threshold values set by the threshold value control means, thereby generating a plurality of

binary images (page 4 lines 5-17, page 7 paragraph "Segmentation of Inside of Breast Region" to page 8 lines 1-20. Image reconstruction is base on high or low density of pixel values that is determine by the threshold value.)

a primary-label region extracting means which attaches a primary label to an isolated region in each of the binary images and extracts the isolated regions attached with the primary label as primary-label regions (page 5 paragraph "2)Automatic Extraction of Breast Region", page 5 paragraph "1) Classification of Images" to page 6-7. Classification is seen as primary –label region.)

a growth score calculating means which calculates for each primary-label region a growth score for evaluating the likelihood that the primary-label region represents a growth (page 8 paragraph "3) Detection of Mass Candidates" to page 9 line 1-6. Analyzing the boundary of the region of interest to determine if mass of interest is growth or benignant.), and

a prospective abnormal shadow region detecting means which compares the growth scores for the respective primary-label regions with each other and detects as the prospective abnormal shadow region a predetermined number of primary-label regions which are higher in the growth score than any of the others (page 12 paragraph "4) Elimination of False-Positive Candidates" to page 13 lines 1-22, page 12 lines 24-25. Creation of the standard deviation is the result of all the primary-label regions. Thus, the standard deviation is the rule that is compare with each other.).

(2) Regarding claim 2:

a secondary-label region judges whether the respective isolated regions have been extracted twice or more (page 13 paragraph "(3) Reanalysis" to page 15. The paragraph show that reanalysis, which is seen as secondary-label region, functions as re-examination of the primary-labels, where the re-examming is base on a different threshold than that was use before. The difference of the threshold hold values enable that labeling regions that will be different from those that are label as primary) as the primary-label regions by the primary-label region extracting means (page 5 paragraph "2)Automatic Extraction of Breast Region", page 5 paragraph "1) Classification of Images" to page 6-7. Classification is seen as primary –label region.),

(ii) excludes the primary-label regions for the isolated regions extracted twice or more, leaving only the primary-label region (page 13 paragraph 30 Reanalysis discloses where a different threshold values use for the reanalysis of the region again; this will enable that the primary-label region will be excluded) having the highest growth score (page 24 lines 5-15 disclose the determine of growth score base on feature analysis of area, circularity and standard deviation and contrast, which can determine the growth of that particular region) for each of the isolated regions extracted twice or more, as well as leaving the primary-label region or regions for the isolated region or regions extracted only once (page 13 paragraph 30 Reanalysis discloses where a different threshold values use for the reanalysis of the region again; this will enable that the primary-label region will be excluded),

(iii) attaches a secondary label (page 13 paragraph "(3) Reanalysis" to page 15. The paragraph show that reanalysis, which is seen as secondary-label region, functions as re-examination of the primary-labels, where the re-examming is base on a different threshold than that was use before. The difference of the threshold hold values enable that labeling regions that will be different from those that are label as primary) as the primary-label regions by the primary-label region extracting means (page 5 paragraph "2)Automatic Extraction of Breast Region", page 5 paragraph "1) Classification of Images" to page 6-7. Classification is seen as primary –label region) to each of the primary-label regions (page 5 paragraph "2)Automatic Extraction of Breast Region", page 5 paragraph "1) Classification of Images" to page 6-7. Classification is seen as primary –label region.) which have been left after the exclusion of item (ii), and determines a growth score for each of the secondary-label regions (page 24 lines 5-15 disclose the determine of growth score base on feature analysis of area, circularity and standard deviation and contrast, which can determine the growth of that particular region) on the basis of the growth scores (page 24 lines 5-15 disclose the determine of growth score base on feature analysis of area, circularity and standard deviation and contrast, which can determine the growth of that particular region) for the respective primary-label regions (page 5 paragraph "2)Automatic Extraction of Breast Region", page 5 paragraph "1) Classification of Images" to page 6-7. Classification is seen as primary –label region) which have been left after the exclusion of item (ii),

wherein the prospective abnormal shadow region detecting means (page 24 lines 3-20 discloses the method of detecting mass shadows in regions of interest) compares the growth scores (page 24 lines 5-15 disclose the determine of growth score base on feature analysis of area, circularity and standard deviation and contrast, which can determine the growth of that particular region) for the respective secondary-label regions (page 13 paragraph "(3) Reanalysis" to page 15. The paragraph show that reanalysis, which is seen as secondary-label region, functions as re-examination of the primary-labels, where the re-examming is base on a different threshold than that was use before. The difference of the threshold hold values enable that labeling regions that will be different from those that are label as primary) as the primary-label regions by the primary-label region extracting means (page 5 paragraph "2)Automatic Extraction of Breast Region", page 5 paragraph "1) Classification of Images" to page 6-7. Classification is seen as primary –label region) with each other, and detects, as the prospective abnormal shadow regions (page 24 lines 3-20 discloses the method of detecting mass shadows in regions of interest), a predetermined number of secondary-label regions which are selected in the order of increasing growth (page 23 discloses where the database as number of the images of regions are to be updated through the classification/labeling system base on the different thresholds are use for detection).

(3) Regarding claims 3 and 12:

which the threshold value control means stepwise sets a plurality of threshold values in the range covering all the pixel values which theoretically the pixel can take (page 6 lines 10-25).

(4) Regarding claims 4 and 13:

which one step at which the threshold value control means stepwise sets a plurality of threshold values is fixed to a predetermined pixel value (page 9 lines 20-25, page 10 lines 2-6, page 10 lines 20-25. Threshold pixel values, likes T5 and T6, are already predetermined from percentages of the pixels.).

(5) Regarding claims 6 and 15:

which the threshold value control means stepwise sets a plurality of threshold values in the range between a minimum pixel value which is minimum in the values of the pixels actually existing in the region of the object and a maximum pixel value which is maximum in the values of the pixels actually existing in the region of the object (page 6 lines 10-25. The regions are the blocks that has already be determine as interest. The pixels values inside the blocks are determined and to be compare.).

(6) Regarding claims 7 and 16:

which one step at which the threshold value control means stepwise sets a plurality of threshold values is fixed to a predetermined pixel value (page 9 lines 20-25, page 10 lines 2-6, page 10 lines 20-25. Threshold pixel values, likes T5 and T6, are already predetermined from percentages of the pixels.).

(7) Regarding claims 9 and 18:

which one step at which the threshold value control means stepwise sets a plurality of threshold values is changed according to the pixel value range (page 9 lines 20-25, page 10 lines 2-6, page 10 lines 20-25. Threshold pixel values, likes T5 and T6, are already predetermined from percentages of the pixels. The values can also change due because of the dependency of the percentages to be calculated.).

(8) Regarding claims 10 and 19:

which the one step is changed according to the class into which the pixel is classified in a histogram which shows the pixel value distribution in the radiation image data (page 6 lines 10-14).

(9) Regarding claims 11 and 20:

which the growth score is calculated on the basis of at least one of the brightness, the circularity, and the size of the primary-label region (page 24 lines 5-15).

(10) Regarding claims 5, 8, 14 and 17:

which said predetermined pixel value is equal to the minimum unit of the pixel value (page 10 lines 20-25).

(11) Regarding claims 23-24:

where the stepwise (page 6 lines 10-25 discloses the low, maximum average and high pixel values thresholds, where low, average and high is seen as stepwise upward in threshold values) setting of the plurality of threshold values (page 6 lines 10-25 discloses the low, maximum average and high pixel

values thresholds) is based on an uniform adjustment of the threshold (page 6 lines 5-26 to pages 7 lines 1-12 discloses where the histogram is create and how the threshold values are uniformly adjusted out from the histogram), where the stepwise adjustment is based on imaged data distribution (page 6 lines 5-25 disclose histogram, where the histogram is image data distribution where the stepwise adjustment are based on).

(12) Regarding claim 25:

which the binary-coding processing binarizes whole images (page 6 lines 5-25 discloses the determination of the threshold values, page 7 lines 10-26 to page 8-9 disclose where the binarize of whole image is applying the threshold values on the images. Due to one threshold value that has been apply the image is binarized; the region of interest that are to the one threshold value will be seen and extracted).

(13) Regarding claim 26:

wherein the binary image generating means (page 7 lines 10-26 to page 8-9 disclose where the binarize of whole image is applying the threshold values on the images. Due to one threshold value that has been apply the image is binarized; the region of interest that are to the one threshold value will be seen and extracted) generates a plurality of binary images (page 9 lines 9-15 disclose the application of two threshold values on the image for detections for different regions of interest) by performing the binary-coding processing on at least a part of the radiation image represented by the radiation image data using the plurality

of threshold values (page 8-9 discloses segmentation with different threshold values, where two threshold values are used for detection and detection is carried out for each of the regions. For example one threshold values for thick glandular regions while another is use for fatty regions).

3. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over over Tomoko Matsubara (Development of high-speed processing algorithm for mass detection based on thresholding technique in mammograms. Medical Imaging Technology Volz 15 No. I January 1997 Research Paper , pages 1-13, IDS) in view of Yoshida (US 2003/0021478 A1).

(1) Regarding claim 21:

Matsubara teaches regarding plurality of threshold values to pixel values (page 6 lines 5-25 disclose the determination of threshold values from the histogram; values such as low, maximum average and high, where the first threshold can be the high and the last threshold can be maximum average or low values such that gradually reduction of pixel values will goes toward those values).

Matsubara does not teach regarding maximum and minimum brightness of the pixel values that will gradually reduced.

However, Yoshida teaches regarding maximum and minimum brightness of the pixel values that will gradually reduced (page 4 paragraph 0067 discloses

detection of shaded regions base on brightness range of maximum to minimum values).

It would have been obvious to one skill in the art at the time of the invention to employ Yoshida teachings to Matsubara regarding using gradual reduction of brightness values to further find detail of the images.

The motivation to combine the teachings such that instead of just binary images created by the threshold it will enable us to find multiple characteristics regions, tone characteristics and area information for further regions identification (page 1 paragraph 0010).

4. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tomoko Matsubara (Development of high-speed processing algorithm for mass detection based on thresholding technique in mammograms. Medical Imaging Technology Volz 15 No. I January 1997 Research Paper , pages 1-13, IDS) in view of Takeo et al (US 2003/0039385 A1).

(1) Regarding claim 22:

Matsubara teaches regarding radiation image date of the object.

Matsubara does not teach regarding where the threshold is predetermined and independent from the image data.

However, Takeo et al teach regarding where the threshold is predetermined and independent from the image data (page 1 paragraph 0011,

page 6 paragraph 0067 disclose where there is a predetermined threshold value to detect the suspected anomalous shadows).

It would have been obvious to one skill in the art at the time of the invention to employ Takeo et al teachings to Matsubara regarding predetermined threshold values. Having predetermined threshold values show a uniqueness in the detection for testing of the user. Where it will show that the user had determine from their testing over time that there is a narrow regions of threshold that will extract the needed data for detection of object of interest.

The motivation to combine the teachings where it will enable the capable of enhancing and highlighting the shadows of object of interest in the structure image (page 2 paragraph 0013). With the variety of characteristics of unclear shadows it is desirable that a independent/unique threshold values is consider to detect them (page 2 paragraph 0014).

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Saotome et al (US PGPUB 20020051515) disclose method of and system for detecting prospective abnormal shadow.

Tsujii et al (US PGPUB 20030007674) disclose image processing apparatus and method.

Goto (US PGPUB 20030179915) disclose image diagnosis supporting device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tsung-Yin Tsai whose telephone number is (571) 270-1671. The examiner can normally be reached on Monday - Friday 8 am - 5 pm ESP.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571)272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tsung-Yin Tsai
July 11, 2007

JINGGE WU
SUPERVISORY PATENT EXAMINER